

CLAIMS

What is Claimed is:

1. A fin actuator(s), in a portable missile, that substantially limits backlash, comprising:
 2. means for rotating a power shaft, said means for rotating operatively configured to rotate said power shaft in a forward direction and a reverse direction;
 4. means for converting rotational movement of said power shaft to linear movement, wherein said means for converting rotational movement of said power shaft includes a lead screw fixedly coupled to said power shaft, said lead screw having a lead nut threadingly engaged moving linearly along said lead screw in relation to the direction of rotation of said power shaft; and
 9. means for converting said linear movement of said lead nut to rotational movement of a fin shaft, wherein said means for converting said linear movement includes said lead nut operatively coupled to a crank arm, said crank arm fixedly coupled to said fin shaft, effecting the rotation of said fin shaft according to the linear movement of said lead nut.
1. 2. The actuator(s) of claim 1, wherein said means for rotating a power shaft comprises a reversible electric motor.
1. 3. The actuator(s) of claim 1, wherein said lead screw, said lead nut, and said crank arm are so constructed and coupled as to limit the total backlash of said actuator(s) measured at said fin shaft to less than about 0.1 degrees.

1 4. The actuator(s) of claim 1, wherein said actuator(s) is dimensioned and configured to fit in
2 said portable missile of less than about 5 lbs.

1 5. The actuator(s) of claim 1, wherein said actuator(s) is dimensioned and configured to fit in
2 an actuator section of said portable missile of less than about 2 inches in diameter.

1 6. The actuator(s) of claim 1, wherein said actuator(s) is dimensioned and configured to fit in
2 an actuator section of said portable missile of less than about 3 inches in length.

1 7. The actuator(s) of claim 1, wherein said actuator(s) is dimensioned and configured to
2 provide at least about 50 oz-in of torque to said fin shaft.

1 8. The actuator(s) of claim 1, wherein said actuator(s) is dimensioned and configured to
2 provide from at least about -20 degrees to at least about +20 degrees of deflection of said fin
3 shaft.

1 9. The actuator(s) of claim 1, wherein said crank arm and said fin shaft is a unitary structure.

1 10. A method for fin actuation(s), in a portable missile, that substantially limits backlash,
2 comprising:

3 providing a means for rotating a power shaft, said means for rotating operatively
4 configured to rotate said power shaft in a forward direction and a reverse direction;

5 providing a means for converting rotational movement of said power shaft to linear
6 movement, wherein said means for converting rotational movement of said power shaft includes
7 a lead screw fixedly coupled to said power shaft, said lead screw having a lead nut threadingly
8 engaged moving linearly along said lead screw in relation to the direction of rotation of said
9 power shaft; and

10 providing a means for converting said linear movement of said lead nut to rotational
11 movement of a fin shaft, wherein said means for converting said linear movement includes said
12 lead nut operatively coupled to a crank arm, said crank arm fixedly coupled to said fin shaft,
13 effecting the rotation of said fin shaft according to the linear movement of said lead nut.

1 11. The method of claim 10, wherein said means for rotating a power shaft comprises a
2 reversible electric motor.

1 12. The method of claim 10, wherein said lead screw, said lead nut, and said crank arm are so
2 constructed and coupled as to limit the total backlash measured at the fin shaft to less than
3 about 0.1 degrees.

1 13. The method of claim 10, wherein said fin actuation(s) occurs within a portable missile of
2 less than about 5 lbs.

1 14. The method of claim 10, wherein said fin actuation(s) occurs within an actuator section of
2 said portable missile of less than about 2 inches in diameter.

1 15. The method of claim 10, wherein said fin actuation(s) occurs within an actuator section of
2 said portable missile of less than about 3 inches in length.

1 16. The method of claim 10, wherein said fin actuation(s) provides at least about 50 oz-in of
2 torque to said fin shaft.

1 17. The method of claim 10, wherein said fin actuation(s) provides from at least about -20
2 degrees to at least about +20 degrees of deflection of said fin shaft.

1 18. The method of claim 10, wherein said crank arm and said fin shaft is a unitary structure.

1 19. A fin actuator(s), in a portable missile, that substantially limits backlash, comprising:
2 a reversible electric motor for rotating a power shaft, said power shaft extending
3 from said motor;
4 a lead screw fixedly coupled to said power shaft, said lead screw having a lead nut
5 threadingly engaged moving linearly along said lead screw in relation to the direction of
6 rotation of said power shaft; and
7 said lead nut operatively coupled to a crank arm, said crank arm fixedly coupled to
8 said fin shaft, effecting the rotation of said fin shaft according to the linear movement of said
9 lead nut.

- 1 20. The actuator(s) of claim 19, wherein said lead screw, said lead nut, and said crank arm are
- 2 so constructed and coupled as to limit the total backlash of said actuator(s) measured at said
- 3 fin shaft to less than about 0.1 degrees.
- 1 21. The actuator(s) of claim 19, wherein said actuator(s) is dimensioned and configured to fit in
- 2 said portable missile of less than about 5 lbs.
- 1 22. The actuator(s) of claim 19, wherein said actuator(s) is dimensioned and configured to fit in
- 2 an actuator section of said portable missile of less than about 2 inches in diameter.
- 1 23. The actuator(s) of claim 19, wherein said actuator(s) is dimensioned and configured to fit in
- 2 an actuator section of said portable missile of less than about 3 inches in length.
- 1 24. The actuator(s) of claim 19, wherein said actuator(s) is dimensioned and configured to
- 2 provide at least about 50 oz-in of torque to said fin shaft.
- 1 25. The actuator(s) of claim 19, wherein said actuator(s) is dimensioned and configured to
- 2 provide from at least about -20 degrees to at least about +20 degrees of deflection of said fin
- 3 shaft.
- 1 26. The actuator(s) of claim 19, wherein said crank arm and said fin shaft is a unitary structure.